

Page 62,

Line 14, change "overflow" to --overflows--.

IN THE CLAIMS:

Please cancel Claims 1 through 10 without prejudice to or disclaimer of the subject matter recited therein.

Please add Claims 11 through 36 as follows:

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Pub B¹
--11. An optical apparatus comprising:
means for forming an image to be observed; and
an ocular optical system for leading said image to
an observer's eyeball,
said ocular optical system including, in order from
said image side, a third surface which forms an entrance
surface, a first surface which forms both a reflecting
surface and an exit surface, and a second surface which forms
a reflecting surface, said first to third surfaces being
integrally formed with a medium disposed therebetween,
wherein said medium has a refractive index larger
than 1,
wherein said means for forming an image is an image
display device for forming an image for observation,
said device being disposed at a position facing
said third surface,

A³
Cont'd.

B¹
wired

said optical apparatus further comprising means for fitting both said device and said ocular optical system to an observer's head,

wherein at least said first surface in said ocular optical system is formed from a rotationally asymmetric curved surface so as to correct aberrations produced by a decentered surface having an optical action.

12. An optical apparatus according to claim 11, a combination of said device and said ocular optical system being provided for each of observer's left and right eyeballs so as to lead an image to each of the observer's left and right eyeballs.

13. An optical apparatus according to claim 12, further comprising:

a see-through optical system disposed in the vicinity of the second surface of said ocular optical system to transmit a bundle of light rays from an outside world and lead it to the second surface of said ocular optical system; and

a shutter provided at a side of said see-through optical system which is closer to the outside world, said shutter allowing light to be selectively transmitted or shut off.

A³
Contd.

14. An optical apparatus according to claim 13, wherein a surface of said see-through optical system on which outside world light is incident has a configuration approximated to the first surface of said ocular optical system, and a surface of said see-through optical system from which outside world light emanates has a configuration approximated to the second surface of said ocular optical system.

15. An optical apparatus according to claim 11, further comprising:

a see-through optical system disposed in the vicinity of the second surface of said ocular optical system to transmit a bundle of light rays from an outside world and lead it to the second surface of said ocular optical system; and

a shutter provided at a side of said see-through optical system which is closer to the outside world, said shutter allowing light to be selectively transmitted or shut off.

16. An optical apparatus according to claim 15, wherein a surface of said see-through optical system on which outside world light is incident has a configuration approximated to the first surface of said ocular optical system, and a surface of said see-through optical system from

a³
Cont'd.

which outside world light emanates has a configuration approximated to the second surface of said ocular optical system.

17. An optical apparatus comprising:
a device for displaying an image; and
an ocular optical system for projecting an image formed by said device and for leading the image to an observer's eyeball,

said ocular optical system comprising at least first, second and third surfaces, in which a space defined by said surfaces is filled with a medium having a refractive index larger than 1,

said device being disposed at a position facing said third surface,

all
b2

said at least first, second and third surfaces including, in order from the observer's eyeball side toward said device, said first surface which serves as both a refracting surface and an internally reflecting surface, said second surface which serves as a reflecting surface of positive power and which faces said first surface and is decentered or tilted with respect to an observer's visual axis, and said third surface which serves as a refracting surface closest to said device,

wherein at least said first surface in said ocular optical system is formed from a rotationally asymmetric

a³
Cont'd.
b²
wcl

curved surface so as to correct aberrations produced by a decentered surface having an optical action.

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18. An optical apparatus according to claim 17, a combination of said device and said ocular optical system being provided for each of observer's left and right eyeballs so as to lead an image to each of the observer's left and right eyeballs.

19. An optical apparatus according to claim 18, wherein internal reflection from said first surface is total reflection.

20. An optical apparatus according to claim 17, wherein internal reflection from said first surface is total reflection.

21. An optical apparatus according to any one of claims 17 to 20, wherein any one of said first, second and third surfaces is a decentered aspherical surface.

22. An optical apparatus according to claim 21, wherein any one of said first, second and third surfaces is an anamorphic surface.

a³
Cont'd.

23. An optical apparatus comprising:
an image display device; and
an ocular optical system for projecting an image
formed by said image display device and for leading the image
to an observer's eyeball,

said ocular optical system including a decentered
optical element comprising at least first, second, and third
surfaces, in which a space defined by said surfaces is filled
with a medium having a refractive index larger than 1, said
surfaces including, from said observer's eyeball side toward
said image display device, said first surface serving as both
a refracting surface and a totally reflecting surface, said
second surface serving as a reflecting surface of positive
power which faces said first surface and is decentered or
tilted with respect to an observer's visual axis, and said
third surface serving as a refracting surface closest to said
image display device,

said image display device being disposed at a
position facing said third surface,

said ocular optical system further including at
least one optical surface having refracting action, said
decentered optical element and said at least one optical
surface being disposed in an optical path which extends from
said image display device to said observer's eyeball,

wherein at least said first surface in said ocular
optical system is formed from a rotationally asymmetric

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Contd.
b3
wld.

curved surface so as to correct aberrations produced by a decentered surface having an optical action.

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24. An optical apparatus according to claim 23, a combination of said device and said ocular optical system being provided for each of observer's left and right eyeballs so as to lead an image to each of the observer's left and right eyeballs.

25. An optical apparatus according to claim 24, wherein said at least one optical surface is disposed between said observer's eyeball and the first surface of said decentered optical element.

26. An optical apparatus according to claim 24, wherein said at least one optical surface is disposed between the third surface of said decentered optical element and said image display device.

27. An optical apparatus according to claim 24, wherein said at least one optical surface is decentered with respect to said observer's visual axis.

28. An optical apparatus according to claim 23, wherein said at least one optical surface is disposed between

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Cont'd.

said observer's eyeball and the first surface of said decentered optical element.

29. An optical apparatus according to claim 23, wherein said at least one optical surface is disposed between the third surface of said decentered optical element and said image display device.

30. An optical apparatus according to claim 23, wherein said at least one optical surface is decentered with respect to said observer's visual axis.

31. An optical apparatus according to any one of claims 23 to 30, wherein said at least one optical surface and said decentered optical element form an air lens.

32. An optical apparatus according to any one of claims 17 to 20 and 23 to 30, further comprising means for positioning both said device and said ocular optical system with respect to an observer's head.

33. An optical apparatus according to any one of claims 17 to 20 and 23 to 30, further comprising means for supporting both said device and said ocular optical system with respect to an observer's head so that said optical apparatus can be fitted to said observer's head.

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Conc'd.

34. An optical apparatus according to any one of claims 17, 20, 23, and 28 to 30, further comprising means for supporting a pair of said optical apparatuses at a predetermined distance.

35. An optical apparatus according to any one of claims 18, 19, and 24 to 27, further comprising means for supporting said combinations at a predetermined distance.

36. An optical apparatus according to any of one claims 17 to 20 and 23 to 30, wherein said ocular optical system is used as an imaging optical system.--

REMARKS

This is a divisional application of Application No. 08/959,285 filed October 24, 1997 (the "'285 Application").

Claims 11 through 36 are pending, with Claims 11, 17, and 23 being independent. Claims 1 through 10 have been cancelled without prejudice. Claims 11 through 36 have been added. The title has been amended.

The specification has been amended to include changes made in parent Application No. 08/959,285.

Applicants claim priority under 35 U.S.C. § 119 based upon Japanese Priority Application Nos. 6-130301 filed June 13, 1994, 6-204268 filed August 5, 1994, and 6-336063 filed December 22, 1994, and respectfully request